

The AMERICAN JOURNAL *of* MEDICAL TECHNOLOGY

VOLUME 8

MAY, 1942

NUMBER 3

RESEARCHES ON VITAMIN E DEFICIENCY IN THE CHICK*

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In the course of experiments with the rat carried out in the early 1920's it was shown almost simultaneously by three investigators, Evans, Sure and Mattill, that some substance was necessary for reproduction. Without it testicular degeneration accompanied by irreparable destruction of the germinal epithelium occurred in the male, and in the female, temporary but curable sterility developed. Since then the substance, vitamin E, whose absence was responsible for these reactions has not only been isolated but successfully synthesized. Moreover, the results coming from various laboratories have shown that prevention of sterility is only one of several reactions with which vitamin E deficiency is associated and each effect is accompanied by a clear cut pathological syndrome. Even yet, however, it is not known whether vitamin E has some general physiological significance or whether its action is limited to certain tissue, as appears to be the case with some of the other vitamins. As to its clinical applications, we know very little although

* Presented before the Illinois Society of Clinical Laboratory Technicians, Urbana, Illinois, October, 1941.

there has recently been a renewed interest in it because of its relation to neuro-muscular disorders in certain experimental animals. The main problem confronting us, therefore, is the question of the role of vitamin E in the metabolic processes of the animal. I wish, therefore, to present the results of my studies and to outline my own conclusions as to its mode of action. Working with the chick I have encountered several different reactions and have investigated them one after another in the hope that an exhaustive study of one animal would furnish sufficient evidence for a general interpretation of the role of the vitamin.¹

As for the vitamin itself it has not only been isolated but it has also been synthesized and intensively studied chemically. It is one of the higher alcohols and is an amber colored, oily looking substance. It is known as α -tocopherol and has the chemical formula $C_{29}H_{50}O_2$. There are also a number of related substances such as β - and γ - tocopherol which exhibit vitamin E activity but to a lesser degree.

Materials and Methods

Before presenting my results I would like to discuss briefly the methods which have been used in this field of investigation. First, with respect to experimental animals, the rat has been used by many workers. Others have used the guinea pig, rabbit, goat, duck, and turkey. I have used the chick in nearly all of my studies. Secondly, with regard to the establishment of a condition of vitamin E deficiency, two methods have been employed. One of them is the use of a synthetic ration made up of proteins, fats, carbohydrates with the addition of mineral salts and vitamins. The second method is to use a ration composed of foodstuffs which the animal would ordinarily eat and to destroy its vitamin E by treatment with ferric chloride dissolved in ether. The vitamin E is probably oxidized and the ether is removed by evaporation. In my work with the chick I have used the treated ration because of the great difficulty of raising chicks on a synthetic diet. Vitamin A and D concentrates have been added to the treated food to offset any possible destruction during treatment.

¹ These researches are presented in detail in the Archives of Pathology, May and June, 1941, Vol. 31.

Experimental Results

In the course of this work six different and more or less independent reactions have been encountered in the chick. These will be discussed briefly below:

(1) Death of the Embryo

One of the first reactions encountered in the rat was death and resorption of the embryo. Similarly, in the chick, embryos from the eggs of hens on a vitamin E deficient ration failed to complete development. In general, death occurred about the fourth day although a few survived as long as the 10th day. Death was due to two main causes: (a) the occurrence of hemorrhage from blood vessels within the body of the embryo, and, (b) the development of a dense tissue ring in the blastoderm which choked off the circulation to the yolk sac and prevented expansion of the allantois. Thus hemorrhage, starvation and asphyxiation were probably all factors in bringing about the death of the embryo.

It was found that death of the embryo could be entirely prevented if the hens receiving the deficient diet were fed orally two drops of wheat germ oil daily as a source of vitamin E. On withholding the supplement again embryonic mortality quickly returned.

(2) Brain Degeneration

In older chicks which were reared on the treated ration from the time of hatching several other reactions were encountered. After a period of 3 to 4 weeks approximately one-third of the chicks in each group suddenly developed a condition of imbalance and uncertainty of gait followed by complete inability to stand or move about. The birds were usually found lying prone on the floor of the pen, the head bent backward and the legs extended rigidly. Autopsy revealed a condition of hemorrhage and degeneration in the hind brain. This condition was marked by extensive disorganization of the medullary fiber tract, degeneration of the large Purkinje cells and pycnosis and disintegration of the cells of the inner granular layers of the convolutions. Thromboses occurred in the minute capillaries of all layers and hemorrhage was common. Rarely similar degenerative changes were found in the cerebrum.

Many experiments involving the possible relations of this condition to other food factors have been carried out and these, as well

as recent experiments, show definitely that vitamin E deficiency is responsible for the condition.

(3) *Lymphoblastoma in Young Chicks*

Chicks which survived the condition of brain degeneration usually lived for two or three months during which an entirely different reaction developed. These chicks became rough feathered, erratic in gait, droopy and lethargic, and lost appetite. Autopsy showed the presence of numerous lesions in the form of white or creamy spots in the visceral organs—liver, heart, pancreas, gizzard, spleen and lungs being affected most frequently in the order named. In addition, in some of these chicks large gelatinous tissue masses were found infiltrating the visceral organs.

Histological studies showed that the white spots in various organs represented areas where the normal tissues had been destroyed and replaced by a typical delicate reticular tissue associated with large accumulations of lymphocytes. The gelatinous tissue masses were also formed of the same type of reticular tissue. This material behaved like a typical tumor and showed the characteristic invasive and destructive properties of a malignant growth. It was also found that like a tumor it could be successfully transplanted generation after generation.

(4) *Sarcoma of the Intestine*

Another condition encountered in these chicks was the occurrence of extensive foliate tumor masses in the colon and rectum. These growths were sometimes large enough to block the lumen of the tube but in a few cases the wall of the intestine was perforated. Sections of the intestine showed that the foliate tumor masses were formed from the reticular connective tissue cores of the intestinal villi. Ulceration of the gut with accompanying erosion of the epithelium apparently exposed the cores of the villi in the earliest stages of the condition and the subsequent rapid growth and fusion of the reticular tissue produced the larger tumor masses.

(5) *Testicular Degeneration and Sterility in the Male*

In the case of the male rat vitamin E deficiency injures the testes producing sterility and testicular degeneration. In the male

fowl sterility also occurred after prolonged vitamin E deficiency extending over several years but extensive testicular disintegration was not readily produced. Sperm smears, however, showed changes in the heads of the sperm cells before any other effect could be demonstrated. In general, however, the testis of older birds proved very resistant to the effects of vitamin E deficiency.

(6) *Erythrophagocytosis*

In all the experiments discussed so far, the E deficient diet had been fortified by cod or sardine oil as a vitamin A - D supplement. Substitution of halibut liver oil as the source of vitamins A and D produced an entirely different and unexpected result. At the end of three months no external symptoms of trouble were apparent in these birds except paleness of the shanks and graying of the irises of the eyes. At autopsy, however, the liver was profusely spotted with dark mahogany brown nodules and the marrow of the long bones was darker and much firmer than usual. Histological studies of the liver showed numerous areas around the blood vessels where the hepatic cells were enlarged and disintegrating and filled with small brown granules. The vascular sinusoids were widened and gorged with blood cells and extensive phagocytosis of erythrocytes by monocytes and von Kupffer cells had occurred. Histochemical tests with potassium ferrocyanide gave a Prussian blue reaction indicating that the brown granules in the liver cells were composed of an iron compound. Similar deposits occurred in the phagocytes. The reaction, therefore, apparently involves the destruction of red blood cells and deposits of the liberated hemosiderin in the liver cells. As might be expected under these circumstances the bone marrow showed a great decrease in adipose tissue and a corresponding increase in myeloid tissue. This suggests an hypertrophy of the blood forming elements to compensate for the destruction of red blood cells. The results of this experiment show a remarkable difference in the reaction of vitamin E deficient chicks when halibut liver oil is used as a source of vitamins A and D rather than cod or sardine oil, but the reason for the difference in reaction is not yet understood.

Effects of Vitamin E Deficiency in Other Animals

In other experimental animals many studies have already been

made by various investigators. These will be reviewed briefly. In the rat temporary sterility occurs in the female accompanied by fetal resorption. In the male permanent sterility is produced as a result of testicular degeneration. Pseudopregnant females also frequently develop spontaneous deciduomata. In young rats growth is retarded and suckling young exhibit a condition of paralysis associated with muscular dystrophy and degeneration of nerve endings. In very old rats nervous disorders develop. In the rabbit and guinea pig muscular dystrophy develops but in the goat no serious effects have been described. In the duck muscular dystrophy is encountered and young turkeys develop myopathy of the gizzard. The needs of the lower animals for vitamin E have been little studied but one of my students has encountered a whole series of reactions in the guppy including: muscular dystrophy, retardation of development of the gonads, degenerations of the testis, injury to the visceral organs and tumor formation in the gut.

Interpretation of Results

It is evident from the discussion above that the lack of vitamin E can produce a great variety of reactions particularly in young animals. The question arises, therefore, as to how this one substance can be related to all of these reactions. Many explanations have been suggested, for example, that vitamin E is concerned with the utilization of iron, that it is essential to normal functioning of the pituitary gland, that it is related to nuclear activity, or that it is a sort of morphogenic hormone. All of these suggestions fail to explain one or more of its activities. As a result of my own researches, I have been impressed with another possible interpretation of the role of vitamin E.

If we consider the group of chemical substances known as the anthracene compounds which include such substances as cholesterol, vitamin D, the male and female sex hormones and carcinogenic compounds, it will be seen at once that the structures affected by vitamin E deficiency are all associated, directly or indirectly, with one or another of these compounds. Thus we would associate the brain with cholesterol, the liver and its various reactions with vitamin D in various forms, the male reproductive system with the male sex hormones and the female reproductive system with the

female sex hormones. The question may be raised, therefore, as to whether or not vitamin E is necessary for proper utilization of chemical substances of this group just as vitamin D is related to the use of calcium.

It appeared to me that some evidence was already available in respect to vitamin D. Hence two experiments were carried out in order to get further evidence along this line as follows: (1) Three groups, each consisting of four, caponized male white leghorn chicks, were reared as follows: Group A on a normal diet, groups B and C on a vitamin E deficient diet. After two months when the head furnishings had completely regressed all were given injections of the male sex hormone testosterone propionate and at the same time the birds in group C were also given doses of synthetic vitamin E. In groups A and C there was an immediate and rapid response and the combs and wattles became large, erect and bright red in color. In group B, which did not receive vitamin E, the response to the hormone injections was much slower and two of the birds showed very little improvement. It was concluded, therefore, that ample vitamin E is necessary for most effective use of the male sex hormone. (2) In the second experiment the condition of brain degeneration was established in several groups of chicks so that chemical determination of the amount of cholesterol could be made from normal and diseased brains. This was done colorimetrically using the photometer to measure the intensity of the Liebermann-Burchard color reaction, after extracting the cholesterol from the brains with chloroform. The results of these determinations indicated a lower cholesterol content in the degenerate brains than in the normal brains. This was taken to indicate that proper utilization of cholesterol was also dependent upon an adequate supply of vitamin E in the diet.

Thus evidence from three different angles supports the suggestion that proper utilization of substances of the anthracene group is dependent upon an adequate supply of vitamin E. If this is the real interpretation of the role of vitamin E then it must have a very broad function in animals since the substances of the anthracene group are of widespread importance in normal metabolism.

Clinical Uses of Vitamin E

The results of the studies which I have carried out on the chick

as well as the work which has been done by other investigators on the rat would seem to indicate that if there is ever a time when vitamin E is important to the animal that period occurs during embryonic development and during early infancy when the nervous system is completing its development and the muscular system is beginning to function effectively. At present two applications of vitamin E therapy are being made: (1) to prevent spontaneous abortion—a condition, however, in which the relation of vitamin E to the utilization of the female sex hormone would suggest that vitamin E be used in conjunction with progesterone, (2) to overcome various types of muscular disorders related to muscular dystrophy and to lateral amyotrophic sclerosis. Considerable success appears to accompany the use of vitamin E in preventing abortion but its use in muscular or nervous disorders has not been very effective possibly indicating that some substance (cholesterol?) should be used in conjunction with it.

The relation of vitamin E deficiency to tumor development suggests some perversion of the metabolism of certain anthracene compounds (in this case vitamin D) during E deficiency and recalls very strikingly the relationship recently demonstrated between vitamin B₁ and butter yellow in the production of certain types of liver cancer in the rat. A more extensive investigation of the interrelationship between individual vitamins and particular food substances might be carried out with profit on the assumption that the vitamins, in general, have a role in the utilization of various metabolites similar to that of catalytic agents.

BLOOD URIC ACID DETERMINATION BY PHOTOELECTRIC COLORIMETRY*

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Introduction

In the method outlined below we have continued to use the two-cell null-point photoelectric colorimeter which we have found in this laboratory to be superior to other types. (1) We have not introduced any new method but only slight changes for use with this instrument.†

Use of Instrument

The colorimeter is heated up for fifteen minutes before use in order to reach a constant. Fill glass cell‡ with water or blank of reagents and place in instrument. Set milliamperage at a definite value of 0.4 M. A., galvanometer adjusted to zero and conduction at 100. The cell is then filled with solution to be tested and light transmission in per cent is found, keeping photoelectric cell output at 0.4 M. A. Graphically the unknown concentration is read direct.

In using filters adjust output of photoelectric cell to 0.4 M. A. before placing filter in filter holder. By means of voltage control regulator** note incoming voltage and hold at this value. Place fil-

* Presented before the American Society of Medical Technologists at the Cleveland meeting, June, 1941.

† Manufactured by Eimer and Amend, New York City.

‡ Standard glass absorption cells 10 x 35 mm. (inside measurement) that have a capacity of 18 cc. Cups are washed clean with soap and water and finally rinsed with distilled water after each determination.

** "Voltrol" type T-1404. Manufactured by the Acme Electric and Manufacturing Co., Cleveland, Ohio. We have found the voltrol very necessary here as the flow of current is not constant.

ter*** in and adjust galvanometer to zero with blank. The instrument is now ready for use.

Method

The method found to give the most satisfactory color range requiring the least amount of technical error in our hands was that of Benedict's (2) direct, using Folin and Wu (3) protein-free blood filtrate.

Preparation of Standards.—A working standard solution containing 1 milligram per cent was prepared from Benedict's Stock Uric Acid Solution (5) as follows:

Into a 500 cc. volumetric flask containing 250 cc. distilled water 25 cc. of the above stock uric acid were placed adding 25 cc. of 10% hydrochloric acid and diluted to volume with distilled water. From this, standards of 1 to 10 milligrams per cent were prepared by adding 10, 20, 30, 40, 50, 60, 70, 80, and 90 cc. into 100 cc. volumetric flasks diluting to volume with distilled water. The 10 milligram per cent standard is had, by taking the required amount for test from the above 1 milligram per cent working standard.

Principle.—Blood filtrate is directly treated with arsenophosphotungstic acid reagent and sodium cyanide and the light transmission value of the solution is read directly from graph.

Procedure.—Into a 150 cc. erlenmeyer flask place seven volumes of distilled water and add one volume of whole oxalated blood. Shake until hemolysis is complete. Add one volume of 10% solution sodium tungstate# while shaking. Add one volume very slowly (drop by drop) while constantly shaking flask of two-thirds normal sulphuric acid. Stopper flask and shake for thirty seconds vigorously. Let mixture stand ten to twenty minutes* and filter. Filtrate should be crystal clear and without foam.

*** No filter is required for the instrument for this method.

J. T. Bakers C. P.

* This increased time (10 to 20 minutes) insures complete protein precipitation. Benedict, Stanley R., Jour. Biol. Chem., 51:193, 1922.

Measure 10 cc. of filtrate (+) into a test tube (pyrex tube, approximately 25 x 195 mm. inside diameter) and add an equal amount of distilled water. From an accurately graduated burette add 8 cc. of 5% sodium cyanide.* To each tube is added 2 cc. of Benedict's Uric Acid Reagent** (arsenic phosphoric acid tungstic). The contents of each tube with blank of reagents*** are mixed by one inversion at once and placed immediately in boiling water for 3 minutes, removed and placed in a beaker of cold water for 3 minutes. Zero photometer with blank, place unknown in cup and convert transmission in milligrams per cent of uric acid from graph.

+ If unknown is found to be stronger than 10 milligrams it is best to repeat test using only 5 cc. of filtrate plus 5 cc. distilled water continuing with the above method.

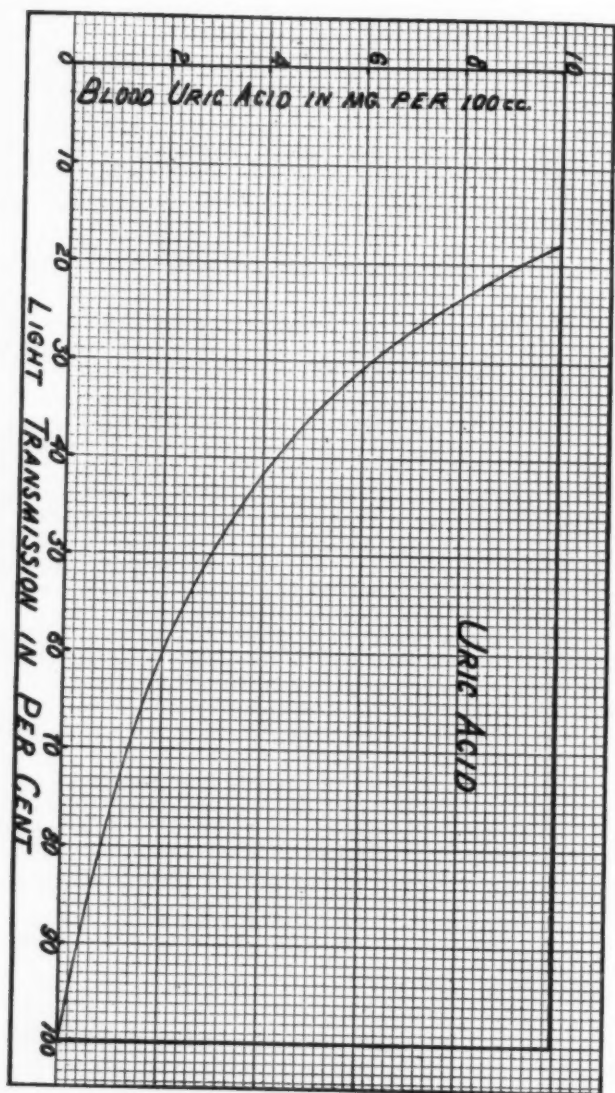
* It was found that in running the various standard dilutions of uric acid that transmissions differed especially between two curves consisting of the same standards, the second following that of making a new solution of the same C. P. sodium cyanide, both weighed on a rough balance. Various strengths of sodium cyanide were then made; namely 2.5, 6.0, 7.5 and 10 per cent. Higher percentages than 5 were found to precipitate too rapidly for reading (4). The 2.5 per cent solution produced practically 50 per cent change in transmission using the same milligram standards in comparison with that of 5 per cent. Following this a 5 per cent solution was prepared by weighing analytically and brought to volume in a volumetric flask. Three different sets of transmissions were then made on each standard (1 to 10 milligrams per 100 cc.) and practically identical transmissions were obtained for each. Following this, accurate care was again taken in preparing the sodium cyanide volumetrically and the fourth set of transmissions on the above same prepared standards again gave practically identical results. Concentrated ammonia or urea was not added to any solution of sodium cyanide.

** Place 100 grams of sodium tungstate C. P. in a liter pyrex flask and dissolve in 600 cc. of distilled water. Add 50 grams of pure arsenic acid and 20 cc. of concentrated hydrochloric acid. Mixture is boiled 20 minutes, cooled and diluted to one liter. Keeps indefinitely.

*** Water distilled 20 cc., sodium cyanide 8 cc. and Benedict's Reagent 2 cc.

Summary

1. Benedict's direct method for the determination of uric acid is presented, adapted for use with the photoelectric colorimeter.
2. It is believed that as accurate preparation as possible of sodium cyanide will furnish more exacting and results with this method.



3. This method according to Benedict and Behre was found to give slightly high results on normal bloods due to other producing substances, however we feel that in using an instrument of this type along with blank of reagents that it is clinically practical and therefore suitable to the needs of most laboratories.

We wish to thank Dr. David Northup for his valuable guidance.

BIBLIOGRAPHY

1. Andes, J. E. and Northup, D. W. Photoelectric Colorimetry I. Determination of Blood Iron and Hemoglobin. *Jour. Lab. and Clin. Med.*, 24:197, 1938.
2. Benedict, Stanley R. *Jour. Biol. Chem.*, 51:187, 1922; 64-215, 1925.
3. Folin, O. and Wu, H. *Jour. Biol. Chem.*, 38:81, 1919.
4. Benedict, Stanley R. *Jour. Biol. Chem.*, 54:236, 1922.
5. Hawk, Philip B. and Bergeim, Olaf. *Practical Physiological Chemistry*, Ninth Addition, 377.

THE ADVANTAGES OF CHEMICALLY INACTIVATED AUTOGENOUS VACCINES

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It is intended here to present a paper with a two-fold purpose: showing the advantages of chemically inactivated autogenous vaccine and reviewing the uses, in general, of autogenous vaccines. Available textbooks give very little information about either of these subjects. The journals seem to be restricted to one or two publications giving interesting and informative articles about autogenous vaccines.

Autogenous vaccines have been tried for practically every clinical infection. Their value seems to be stressed in the treatment of pustular acne, chronic pyelottis, colds, bronchial infections, sinus infections, chronic boils, rheumatic fever, and throat infections. New uses of autogenous vaccines are continually being discovered.

There has been considerable discussion over the relative merits of stock vaccines and autogenous vaccines. It is not the purpose of this paper to consider the merits of these vaccines. However, it will be conceded that autogenous vaccines are of immense value in clearing focal infections, when these are no longer in the active stage.

Autogenous vaccines will help in clearing sinus discharge, after sinus drainage has been established. Such infections are usually caused by Staphylococcus, Pneumococcus, M. catarrhalis, B. influenza, Streptococcus, B. septicus and B. Friedlander. Similarly, autogenous vaccines have been found useful in the treatment of persons having a tendency to frequent head colds.

These vaccines cannot be used in every infection. Autogenous vaccines have uniformly been a failure and are not recommended

in the treatment of septicemias, at least not in the severe forms. In the mild and subacute forms, they have seemed to be helpful at times and at least warrant a trial. Chronic joint infections, arthritis deformans and gonococcal arthritis, have been aided with some success by the use of autogenous vaccines. In retrospect, this type of autogenous vaccine would be too difficult to prepare, at least by the average clinical laboratory.

Some believe an antistreptococcal preparation helps in the treatment of rheumatic fevers. Such preparations for rheumatic fever are not available commercially. Dr. Darrel L. Vaughn, Morganfield, Ky., has had remarkable success in the treatment of two young boys afflicted with rheumatic fever (unpublished report). These boys were hospitalized, and kept until their condition was of the subacute form. Then, cultures of the throat were taken. Pure cultures of *Streptococcus* were obtained. The administration of their respective vaccines speeded the recovery of both patients. (One of the boys had been having a daily high temperature fever for five months, which was stopped on the third week of vaccine therapy).

Such vaccines have been used with success in the treatment of non-tuberculous diseases of the lungs. Also, similar vaccines have been prepared for many of the bronchial infections. These vaccines are usually polyvalent. It is difficult to obtain a culture of only one or two organisms from these infections. It is best to consult a reliable textbook for a safe method of securing such cultures.

This laboratory has prepared a number of autogenous vaccines inactivated by means of chemicals. Our method has been published in an earlier paper. For the purposes of making this paper complete, this method is again outlined.

"(1) The organisms in pure culture (several species of organisms in pure culture may be treated similarly) is spread over six slants of appropriate culture media.

(2) After 24 hours incubation, if the growths are moderate or profuse, a few cubic centimeters of sterile saline are added to each tube, and the growths are scraped off with sterile applicators.

(3) The resulting suspension is filtered through sterile cotton

(an ordinary centrifuge tube, with the bottom cut off, serves as an efficient holder for a small wad of cotton).

(4) The suspension is centrifuged at high speed until the supernatant fluid is clear and the organisms are packed into the end of a sterile graduated centrifuge tube.

(5) The supernatant fluid in the tube is poured off, and sufficient sterile saline added to make a 1% emulsion of the organisms.

(6) The vaccine is made:

1% emulsion of organisms	2 cc.
1% phenol in 0.85% NaCl	5 cc.
Sterile Saline	12 cc.
Merthiolate solution, 1-1000	1 cc.

(For the more pathogenic organisms, it may be necessary to use 1 cc. of the emulsion of organisms, rather than 2 cc. This is usual when *Pneumococcus*, *Acne*, or *Pyocyaneus* are put into a vaccine.)

(7) This finished vaccine is set at room temperature for 24 hours. Then, it is cultured for sterility on slants of appropriate culture media. These slants are heavily inoculated with the vaccine in order to overcome the inhibitory action of the chemicals."

Some suggestions, as to choice of culture media, are offered here to the technologist. Loeffler's blood serum media is widely used for the more fastidious organisms. For the propagation and cultivation of *Streptococcus*, Tryptose Phosphate Broth (Difco Co.) will be found most helpful. The anaerobic organisms, especially *Acne*, will be found to grow abundantly and quickly in Thio-glycollate liquid media (Baltimore Biological Laboratory).

It will be noticed that the above method does not actually count the bacteria in suspension. Since these vaccines contain approximately 200 million per cubic centimeter (the usual concentration of autogenous vaccines is 500 million per cubic centimeter), and since they have proven effective in a large percentage of treatment cases, the somewhat elaborate counting method may be safely dispensed with.

This method uses Merthiolate 1-20,000 plus 0.25 % phenol. Rosenstein and her associates preferred a mixture of Merthiolate (Lilly) plus 0.25 % phenol for sterilizing and preserving their antisera. These mixed chemicals seemed to fortify each other. Powell and Jamieson, of Eli Lilly Laboratories, have given the following conclusions as to the use of Merthiolate (Lilly):

"1. Merthiolate-preserved biological products are self-sterilizing and safe preparations.

2. Merthiolate causes a minimum of injury to labile antigen and antibody fraction.

3. Bacterial cultures devitalized with Merthiolate and culture filtrates prepared with Merthiolate have a high antigenic value.

4. Merthiolate is practically non-injurious to bacteriophages.

5. Merthiolate is most satisfactory as a preservative for serums and antitoxins."

These conclusions justify the use of Merthiolate, and also shows the value of its chemical action. Vaccines killed by heat do not have either this high antigenic value or the large amount of labile antigen in the vaccines. Powell and Jamieson further state, "Such treated and killed vaccine cultures (using Merthiolate) are believed to be antigenically as nearly similar to the living microorganism as has been possible heretofore to produce."

Another advantage in using chemically inactivated vaccines lies in the safe and easy inclusion of viruses. It is possible to obtain bacterial-free filtrates by filtering through Berkfeld V candles. These bacterial-free filtrates may be added to heat-killed vaccines. Also, they can easily be put into the chemically inactivated vaccines, and the self-sterilization will have a beneficent effect on the finished vaccine containing the virus.

The use of viruses in autogenous vaccines is most helpful in the treatment of catarrhal conditions. Some physicians use sterile saline to secure nasal washings from children. These washings are sent to the clinical laboratory for culture and bacteria-free filtrates are made of the washings. When making up the vaccine, the fil-

trate is used in place of the sterile saline for making the bulk of the finished vaccine. It is necessary to keep the filtrate in a sterile container stored in the refrigerator until used.

There are two methods of dosage for administering these vaccines. One method begins with 0.1 cc., and increases by 0.1 cc. every other day (or three times a week may be more convenient, i.e., Mondays, Wednesdays, and Fridays) until 1.0 cc. is reached. This dosage is continued at 1.0 cc. every other day until either the doctor believes the patient is recovered or the vaccine is exhausted.

The other method is to begin with 0.1 cc., and increase by 0.1 cc. every other day until 1.0 cc. is reached. Thereafter, the 1.0 cc. injections are given one week apart. This gives the body's immunity forming system periodic "jolts," stimulating the formation of the specific antibodies. This plan is best for the bronchial conditions.

Sometimes it is impossible to reach the full dosage of 1.0 cc., due to the reactions caused by the vaccine. The physician will usually watch the patient closely, and be alert for such reactions. In this case, the physician will order the reduction in dosage compatible with administering the vaccine safely and effectively. If the laboratory administers the vaccines, any irregularity is reported to the physician. The dosage should cause a moderate local reaction, but should not be sufficient to aggravate the patient's symptoms.

The taking of cultures for vaccines cannot be stressed enough. Some physicians, unless they take a large number of cultures, prefer to have the technologist take the cultures. The physician should take his own cultures, for he can get to the source of infection and obtain the best culture possible. The only check on securing good cultures is the report of the bacteriologist. This report, if based on cultures from authentic infections, should report pathogenic microorganisms. If most of the reports contain similar unimportant microorganisms, there is either a slip in the technic of securing the cultures or the bacteriological procedure is at fault.

It is frequently necessary to spread a mixed culture over a Petri dish containing blood agar media, in order that pure colonies may be picked. This should require only an additional 24 hours. The quicker the vaccines are made, the more potent and effective they

are in use. The usual time needed to make a vaccine is from seven to ten days, including the period of incubation for sterility.

Summary

The advantages of chemically inactivated vaccines over other vaccines are:

1. More quickly and easily made, demanding less of the technologist's time.
2. More potent and effective in the treatment of infections.
3. Have higher antigenic value and more labile antigen, as well as antibody fraction.
4. Viruses are safer when incorporated into vaccines before sterilization.

Note

The writer feels that grateful acknowledgment for valuable assistance in gathering material for this paper is due to Dr. Wendell C. Kelley, of Eli Lilly and Co., and to Miss Gladys Elmore, M.T., Vicksburg Sanitarium, Vicksburg, Miss.

BIBLIOGRAPHY

1. Cecil, Russell, 1937. Textbook of Medicine, W. B. Saunders, p. 178.
2. Turner, Logan, 1936, 4th edition. Nose, Throat and Ear, Wm. Wood and Co., pp. 37 and 67.
3. Brennan, Joseph F., 1938, Vol. 2. Practice of Pediatrics, W. E. Prior and Co.
4. Hughes, 1913. Arthritis Deformans and Gonococcal Arthritis, British Med. Jour.
5. Effects of Vaccines on Non-Tuberculous Diseases of the Lungs, Jour. Lab. and Clin. Med., Vol. 6; 1920-21, p. 353.
6. Rosenstein, C., and Levin, I., 1935.5 The Bactericidal and Antiseptic Action of Preservatives Frequently Used In Biological Products, and the Effects of These Preservatives on the Potencies of the Products, Amer. Jour. of Hyg., 21:260, 279.
7. Nicholson, Daniel, Laboratory Medicine. Lee and Febiger, 1934. Pp. 351-352.
8. Frazer, J. N., Chemical Inactivation of Autogenous Vaccines, American Jour. of Med. Tech. Pp. 233-235; Vol. 7, 1941.
9. Jamieson, W. A., and Powell, H. M., Merthiolate as a Preservative for Biological Products, American Jour. of Hyg. Vol. XIV, No. 1, p. 224.
10. Powell, H. M., and Jamieson, W. A., Merthiolate as a Germicide. Amer. Jour. of Hyg., Vol. XIII, No. 1, p. 299.

ABSTRACTS

TECHNIC FOR SECTIONING SOFT BONES AND HARD TISSUES BY CELLOIDIN AND PARAFFIN METHODS: M. Kolin, *Arch. of Path.*, vol. 33, No. 1, Jan., '42, p. 86.

Both methods are given in detail. Treatment with 5% glacial acetic acid for 24 hours or longer after fixation in formaldehyde, followed by washing 24 hrs. in distilled water before dehydration is recommended.

OXYURIASIS AND APPENDICITIS: J. Schwarz & M. Straub, *Arch. Path.*, vol. 33, No. 1, Jan., '42, p. 28.

Of 36 appendices showing oxyuris invasion, typical mucosal lesions were found in 22. Only 8 showed no inflammation and no changes in the mucosa. When the worm was found penetrating the deeper strata of the appendicial wall, it produced a foreign body reaction and abscess formation. This might be followed by encapsulation and calcification.

The authors believe that oxyuris may be a primary cause of appendicitis.

A RAPID PERTUSSIS AGGLUTINATION TEST: H. M. Powell & W. A. Jamieson, Jr. *Immun.*, vol. 43, No. 1, Jan., '42, p. 13.

The antigen is prepared from pertussis organisms and standardized and adjusted to a turbidity of about 100 billion bacilli per ml. It is colored with methylene blue and preserved with Merthiolate.

The test may be done on a single drop of fresh blood or serum. A positive reaction causes clumping of the blue antigen. The test is carried out on glazed cardboard which when dry may be used as a permanent record. It may be read in one minute.

**RECURRENT NEUTROPHIL AGRANULOCYTOSIS: B. E. Barsby,
H. G. CLOSE, *Lancet*, vol. 1, No. 4, Jan. 24, '42, p. 99.**

A woman of 41 gave a history of pyrexial attacks with sore throat, oral ulcers, a pink rash, joint pains, cough, abdominal pain and vomiting 3-7 days after menstrual periods for 4 years. During the 7 months of observation these attacks were accompanied by neutrophil agranulocytosis. Total white count remained over 4,000 but, on five occasions polymorphs disappeared from the blood completely for 4 or 5 days. Bone marrow examinations revealed no neutrophils during these periods. Eosinophiles and basophiles did occur, however, both in circulating blood and in sternal marrow.

No satisfactory explanation could be found. The only continued medication had been an iodine preparation used in connection with a thyroidectomy. Its effect on bone marrow is not known. The possibility of its being due to hormone concentrations could not be substantiated experimentally and as the relation of attacks to the menstrual cycle did not always obtain during the 7 mos. of observation preceding her death, this must also be questioned.

BLOOD AND PLASMA TRANSFUSIONS IN THE ARMED SERVICES: D. B. Kendrick, Jr., & L. R. Newhouser, *Army Med. Bull.* No. 60, Jan., '42.

Standard methods for typing and cross matching are described. The proposed standard method for preparation and use of transfusion equipment is discussed in detail. Dried and liquid plasma are discussed and the clinical indications for the use of plasma and whole blood are presented.

THE STORAGE OF SYPHILITIC SERUMS: R. M. Myers & C. A. Perry, *Ven. Dis. Information*, vol. 23, No. 2, Feb., '42, p. 56.

Eagle flocculation, Hinton, Kline exclusion and Kline diagnostic and Eagle complement fixation tests were used. Charts are given comparing tests on fresh sera and on those stored 8 to 8½ weeks at 2-4°C. and at minus 27°C. Storage was not detrimental. Sera stored at 2-4°C. were not vitally different from those stored at minus 27°C.

AMEBIASIS IN YAKIMA VALLEY: P. J. Lewis & J. H. Low, Northwest Med., vol. 41, No. 2, Feb., '42, p. 52.

Over a five-year period stool examinations were run on 586 patients. Amoebae were found in 126 or 21.5%. Diagnosis was based on examination of wet and dry smears only. The authors consider all forms of amoebae pathological from a clinical viewpoint. Treatment resulted in apparent cure in 90% of cases.

COMPLEMENT FIXATION IN HUMAN MALARIA. I. RESULTS OBTAINED WITH VARIOUS ANTIGENS: A. D. Dulaney and W. K. Stratman-Thomas, Jr. Immunology, vol. 39, No. 3, Sept., '40, p. 247.

Preparation of the malaria antigen is described. Most satisfactory was that made from *P. knowlesi* by centrifuging laked blood from severely infected monkeys. *P. vivax* and *P. malariae* obtained from human blood were also used. The reaction is group-specific and will not separate the types. Positive Wassermann did not affect the complement-fixation with malarial antigen.

COMPLEMENT FIXATION IN HUMAN MALARIA. II. DIAGNOSTIC APPLICATION. W. K. Stratman-Thomas and A. D. Dulaney, Jr. Imm., vol. 39, No. 3, Sept., '40, p. 257.

In individual cases, the positivity of the complement-fixation test was found to vary as the number of parasites in the blood. It was correlated with the presence or recent presence of parasites rather than with chills or fever.

NEWS AND ANNOUNCEMENTS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts, Department of Public Health, announces an intensive program of Graduate Study in Public Health, beginning June 8, 1942.

The war effort and the maintenance of civilian health have combined to make acute the need for adequately trained public health workers. To help meet this requirement, intensive courses in public health are being offered during two seven-week terms this summer and during an academic year for graduate students beginning June 8, 1942, and ending February 6, 1943. The regular first-semester program for senior and graduate students in public health will be offered in the summer and the regular second-semester subjects will be offered during the term beginning September 28. Properly qualified special students who wish single courses or summer study only will be accepted.

Special training is offered in Public Health Administration, Public Health Engineering, Public Health Bacteriology, and Health Education. The following programs of study in these respective fields are subject to modification to meet individual needs. Prospective students are invited to write to Dr. John W. Williams of this Department for a catalogue of the Institute and for further information with respect to requirements and available collateral courses.

MEDICOFILM SERVICE AND THE CURRENT LIST OF MEDICAL LITERATURE

are conducted under the auspices of the "Friends of the Army Medical Library" for the promotion of medical research by enabling persons not having access to adequate library collections, to learn of the current contributions to medicine and to obtain micro-

film copies of recent and other papers contained in the periodicals received by the Army Medical Library of Washington, D. C. The projects have received the approval of the Surgeon General of the Army and are conducted with the sympathetic and helpful collaboration of the officers and staff of the Library.

The *Current List* differs from existing keys to the medical literature in being a catalog of titles of original papers and not a classified index of their contents. It is a transcript of the cards prepared by the Editorial Section of the Army Medical Library for use in compiling the Index-Catalogue of Medical Literature, and to that extent covers the entire field of medicine. It lists the titles of papers of medical interest appearing in about 2,000 periodicals issued regularly and some 1,300 serials and other publications appearing at irregular intervals. It is intended to satisfy the desires of those who wish to know in the shortest possible time what is being published in the medical field. The time lag between the arrival of the periodicals in the Library and the appearance of the printed list of titles is from one to two weeks.

The number of titles in each weekly issue of 20 to 24 pages is about 1,200 or a total of some 60,000 per year. The preparation of the copy and the publication of the more than 1,200 pages of text for the modest subscription price of \$5.00 per year is made possible only by the cooperation of the staff of the Army Medical Library and the adoption of the economical planograph process of printing. It has been estimated that the total cost of the undertaking will be met by 1,000 subscriptions at \$5.00 per year. Of these more than 800 have been obtained and there is now little doubt that additional ones sufficient to make the project fully self-supporting will be obtained shortly. The only feature which remains uncertain is the publication of an index. It is hoped that it will be possible eventually to provide an index at a cost which is within the income derived from subscriptions.

Medicofilm Service consists of making photographic copies upon 35mm moving picture film of the original papers in medical periodicals for the use of those engaged in research, in lieu of lending the publications. This method is the most economical so far devised, for making a single copy of printed or other texts and permits the

resources of libraries to be placed at the disposal of those near and in far distant places.

Microfilm copies, however, have the disadvantage that they can be read only with the aid of a magnifier or projector. These devices are available at a cost of \$32.50 to \$100.00 or more for a desk projector. Since microfilm copies usually represent only a small part of the literature requirements of individuals, the effort to read them will not be a serious task and will be very greatly compensated for by the advantage of obtaining without effort and at small cost, complete copies of original papers which can be kept for use whenever desired.

Orders for microfilms should show, as completely as possible, the name of the author, title of the paper, name or accepted abbreviation of the journal, the volume, year and inclusive pagination of the article desired. The complete mailing address to which the microfilm is to be sent should also be plainly written on each order.

Since a large part of the expenses of microfilm copying is incurred for accounting and clerical work, an attempt to reduce these has been made. Toward this end a unit price of 25 cents for each complete article not exceeding 25 pages in length, and 10 cents for each additional 10 pages or fraction thereof has been established, and prepayment for the work or advance deposit accounts are not requested. The plan of deferred payment is based on the assumption that if the service is really helpful, orders will be sent frequently and can be paid for more conveniently in groups than separately. The order blank, showing the amount due, is returned with each microfilm and can be kept as a record of the amount to be paid at such times and in the manner found most convenient. Trial orders without accompanying cash are invited and if further service is desired may be paid for together with subsequent orders.

The work in connection with microfilm copying is being done by employees of the Library in time outside regular hours and paid for on the piece basis. This relieves Medicofilm Service of the obligation of having employees at fixed salaries and permits members of the Library staff to earn additional compensation for extra work, and thus stimulates them to a greater personal interest in extending

the facilities of the Library to persons at a distance.

Medicofilm Service and the Current List are non-profit undertakings operated solely for the advancement of medicine. All who are able to make profitable use of them are invited to enroll in the group of "Friends of the Army Medical Library" and cooperate in the advancement of medical research through the wider utilization of the resources of the Army Medical Library.

Enrollments, subscriptions and orders for microfilms should be addressed to Medicofilm Service, Army Medical Library, 7th St. & Independence Ave. S. W., Washington, D. C.

FIFTEENTH ANNUAL "RADIUM NUMBER" OF MISSISSIPPI VALLEY MEDICAL JOURNAL AND RADIOLOGIC REVIEW

The March issue is the Fifteenth annual "Radium Number" of the *Mississippi Valley Medical Journal and Radiologic Review* (Quincy, Ill.), and all its articles are original ones, especially written for this number, by well-known radium therapists. There is an interesting article by Kaplan of the New York University on the use of radium in abnormal uterine conditions. Pohle of the University of Wisconsin describes a case of squamous cell esophageal cancer, microscopically proven, free from recurrence 7 years after radiation treatment. Rosh of Bellevue Hospital, New York, emphasizes the great value of treating hemangiomas in young children with radium. Swanberg of Quincy, Ill., gives an interesting statistical analysis of the latest 5 year end-results of 1796 patients suffering from uterine cervical cancer, treated in radiation therapy in 18 radiotherapeutic centers in 8 countries as reported to the League of Nations. All these cases were patients in which treatment was begun in 1933. Incidentally the best results were those obtained at the Radium Institute of the University of Paris. Space will not permit mention of the other interesting articles in this annual "Radium Number."

With the simultaneous publication of the June issue of the *Annals of Surgery* in Philadelphia by the J. B. Lippincott Company, and in Buenos Aires by the Guillermo Kraft Company, a new

step is being taken toward the consolidation of medical interests here and in South America. The *Annals of Surgery* is the oldest surgical journal in the English language. Its appearance now in Spanish will mark a high spot in the Lippincott Company's celebration of its sesquicentennial this year. As the result of negotiations and with the assistance of the Coordinator of Inter-American Affairs, and Mr. Lewis Hanke, Director of the Hispanic Foundation, Guillermo Kraft Company, one of the oldest and most respected publishing firms in Buenos Aires, will translate the *Annals of Surgery* each month for South American physicians and surgeons. The medical profession in this country has become increasingly aware of its obligations and responsibilities in South America. No better symbolic demonstration can be given of its sincere willingness to develop permanent intellectual fraternization between the surgeons of the two continents.

Ohio

The annual spring meeting of the Ohio Society of Medical Technologists was held at the Neil House, Columbus, Ohio, April 22, 1942, and the following program was presented:

Registration—10:00 A.M.

Business Meeting—10:30 A.M.

Luncheon—12:30 P.M.

Program—Roundtable discussion conducted by Dr. H. L. Reinhart, Columbus, Ohio.

3:00 P.M.—Scientific Program.

"Biochemical Aspects of Psychiatry," Dr. Dorothy Donely, Columbus, Ohio.

"Virus Immunology," Virginia Watson, Miami Valley Hospital, Dayton, Ohio.

"Concentration Test for T.B.," Mary Shearer Rose, Youngstown, Ohio.

"Blood Counts in Allergy," Evelyn Jagoda, Youngstown, Ohio.

After the Scientific Program the Columbus Society of Medical Technologists entertained at an informal social. The Ohio Hospital Association invited members of the Ohio Society of Medical Technologists to attend their banquet given at 8:00 P.M., Wednesday, April 22, 1942.

Nebraska

The spring meeting of the Nebraska Society of Medical Technologists was held March 28, 1942, at Lincoln, Nebraska.

Business meeting, during which the following officers were elected for 1942-43:

President—Ida Carr Blore, 303 South 28th, Lincoln, Nebr.

President-elect—Wilma Eicher, 345 N. 37th St., Omaha, Nebr.

Vice-President—Bernice Elliott, 5107 Webster St., Omaha, Nebr.

Secretary—Ruth Pohle, 352 N. 41st St., Omaha, Nebr.

Treasurer—Mary McMillan, 912 S. 37th St., Omaha, Nebr.

Sixth Council Member—Margaret Colfer, 206 LaFayette Apt., Lincoln, Nebr.

Program—Afternoon—Sharp Building.

“Normal Hemoglobin and Red Counts in Children” by Dr. Paul Bancroft, Lincoln, Nebr.

Evening—Banquet, Cornhusker Hotel.

“Parasitology” by Dr. H. W. Manter, Department of Zoology, University of Nebraska, Lincoln, Nebr.

AMERICAN SOCIETY OF MEDICAL TECHNOLOGISTS

PROGRAM OF THE
TENTH ANNUAL CONVENTION



June 8, 9, 10, 1942

Philadelphia, Pa.

HEADQUARTERS — THE BENJAMIN FRANKLIN



The Benjamin Franklin
PHILADELPHIA
(Headquarters)



COMMITTEE CHAIRMEN

Program—CLARYCE M. PITTS, Austin, Texas.

Exhibits—MARIAN A. BAKER, Newark, N. J.

Publicity—DAVID SILCOCK, Versailles, Ky.

Local Arrangements—FANNIE K. DE SILVER, Philadelphia, Pa.

Entertainment—DOROTHEA ZOLL, Philadelphia, Pa.

Sisters' Reservations—SISTER FRANCES MALONEY, Philadelphia, Pa.

Registration—ROSE EDITH MATTHAEI, Houston Texas.

Awards—EVELYN N. JARDINE, Hanover, N. H.



REGISTRATION—Members and guests are requested to register upon arrival, at the registration desk, Benjamin Franklin.

RESERVATIONS—If you have not already made your reservations, write immediately using form in advertising section of this issue of the Journal.

ACCOMMODATIONS for Sisters wishing to attend the Convention have been arranged for by Sister M. Frances, M.T. (ASCP), St. Joseph's Hospital, Philadelphia, Pennsylvania, Chairman of the Sisters' Reservations Committee. Please write Sister M. Frances or Warburton Hotel, Twentieth and Sansom Streets, Attention of Frank Hickey, Manager. This hotel is for ladies exclusively. Reservations may also be obtained at the Warwick Hotel, 17th and Locust Streets, by writing direct.

TRANSPORTATION—For transportation, see you local agent for fares and routes.

American Society of Medical Technologists

TENTH ANNUAL CONVENTION

HEADQUARTERS, THE BENJAMIN FRANKLIN
PHILADELPHIA, PENNSYLVANIA

JUNE 8-9-10, 1942

Registration June 8-9-10, 1942, 8:30 A.M. to 10:00 A.M.

Exhibits Open 12-2 and 4-9 P.M. Daily



MONDAY MORNING, JUNE 8—10 A.M. to 12 M.

Presiding—CLARYCE M. PITTS, M.T. (ASCP),
Austin Texas.

OPENING SESSION

INVOCATION—Rev. Herbert W. Jones, St. Peters
Church, Philadelphia, Pennsylvania

ANNOUNCEMENTS

PRESIDENT'S MESSAGE—L. O. Ray, M.T. (ASCP), Orlando, Florida

1. "The Weltmann Serum Coagulation Reaction, Comparison with the Sedimentation Rate in 1650 Examinations" — MARIAN BAKER, M.T. (ASCP), Newark, New Jersey

SELECTION OF CONVENTION DELEGATES

NOON

MONDAY AFTERNOON, JUNE 8—2 P.M. to 5 P.M.

Presiding—BERNICE ELLIOTT, M.T. (ASCP),
Omaha, Nebraska

1. "The Laboratory Identification of Intestinal Parasites," DR. EMMA MOSS, Director of Department of Pathology, Charity Hospital, New Orleans, Louisiana
2. "Modernizing Color and Volume Index," CECILIA KORTUEM, M.T. (ASCP), Chicago, Illinois
3. "Practical Points on Plasmodium Identification," DR. JOHN J. ANDUJAR, Director of Laboratories, Harris Memorial Hospital, Fort Worth, Texas
4. "An Unrecorded Member of the Genus Eberthella," LOUIS C. HERRING, M.T. (ASCP), Orange General Hospital, Orlando, Florida
5. "The Detection of Acetone in Urine," PHYLIS STANLEY, M.A., M.T. (ASCP), Pathological Laboratories, Presbyterian Hospital, Newark, New Jersey

MONDAY EVENING, JUNE 8

Refer to Entertainment Program

TUESDAY MORNING, JUNE 9—9 A.M. to 12 M.

Presiding—HENRIETTA M. LYLE, M.T. (ASCP),
Columbia Pennsylvania

1. "Laboratory Aids in the Diagnosis of Chancroid, Granuloma Inguinale and Lymphogranuloma Venereum," DR. ROBERT GREENBLATT, Professor of Experimental Medicine, University of Georgia, Augusta, Georgia
2. "Spirochaetal Antigens in the Serology of Syphilis," DR. JOHN A. KOLMER, Director of Research, Institute of Cutaneous Medicine, Philadelphia, Pennsylvania
3. "Evaluation Results of State Laboratories and Report of Washington Serology Conference of Author Serologists," DR. R. C. ARNOLD, P. A. Surgeon, U.S.P.H.S., V. D. Research Laboratory, Staten Island, New York
4. Seminar, "Standard Tests Procedures in the Serodiagnosis of Syphilis," DR. R. C. ARNOLD, U.S.P.H.S., V. D. Research Laboratory, Staten Island, New York, to conduct discussion with serologists from Author Serologists Laboratories

NOON

TUESDAY AFTERNOON, JUNE 9—1 P.M.

Refer to Entertainment Program.

TUESDAY AFTERNOON, JUNE 9—2 P.M.

SESSION OF THE HOUSE OF DELEGATES

Members are advised to follow entertainment program if not in session with the House of Delegates

TUESDAY EVENING, JUNE 9

Refer to Entertainment Program

WEDNESDAY MORNING, JUNE 10—9 A.M. to 12 M.

Presiding—EVELYN JARDINE, M.T. (ASCP),
Hanover, New Hampshire

1. "Cultivation of Anaerboes," DR. JOHN H. BREWER, Hynson, Westcott & Dunning Laboratories, Baltimore, Maryland
2. *Triatoma heidemanni* as a Possible Vector of Relapsing Fever," THELMA DESHAZO, M.T. (ASCP), Texas State Department of Health, Bureau of Laboratories, Austin, Texas
3. "The Laboratory Diagnosis of Diphtheria," DR. MARTIN FROBISHER, JR., Department of Bacteriology, John Hopkins University.
4. "Laboratory Economy," CECELIA KORTUEM, M.T. (ASCP), Chicago, Illinois

NOON

WEDNESDAY AFTERNOON, JUNE 10—2 P.M. to 5 P.M.

Presiding—CECELIA KORTUEM, M.T. (ASCP),
Chicago, Illinois

1. "Morphological Differentiation Between Mononuclear Cells with Particular Reference to the Lymphocytes and Monocytes," ESTELLE DOWNER, M.T. (ASCP), Milwaukee County General Hospital, Wauwatosa, Wisconsin
2. "Opportunities and Responsibilities of the Medical Technologist," DR. WM. SUNDERMAN, Professor of Research Medicine, University of Pennsylvania, Philadelphia, Pennsylvania

3. "Training the Metabolism Patient to Successful Performance," JESSE K. LEX, M.T. (ASCP), Peoria, Illinois
4. "Methods of Demonstrating Tubercle Bacilli in Sputum and Other Materials," JOSEPH M. SCOTT, M.T. (ASCP), Ninette, Manitoba, Canada
5. "Conference for Teachers of Medical Technology," conducted by MRS. EVELYN JARDINE, M.T. (ASCP), Mary Hitchcock Memorial Hospital, Hanover, New Hampshire
6. "Cryochem Process in the Laboratory" by MOLLIE L. HILL, M.T. (ASCP), 109 Virginia Avenue, Aspinwall, Pennsylvania

WEDNESDAY EVENING, JUNE 10

ANNUAL BANQUET

Refer to Entertainment Program

ENTERTAINMENT PROGRAM

MONDAY, JUNE 8

6:30 P. M.—Dinner at The Shanghai Garden

This restaurant is located in Philadelphia's "Chinatown" and is within walking distance of the Benjamin Franklin Hotel. The food is truly prepared in the real Chinese way.

The evening will be free for the purpose of getting acquainted. Suggestions will be made to those who wish entertainment.

TUESDAY, JUNE 9

1:00 P. M.—Luncheon

Place to be announced. There will be a guest speaker of prominence.

2:00 P. M.

A trip to the Franklin Institute and the Philadelphia Art Museum or a trip including some of the historical buildings in the city.

Evening

There will be fifty tickets reserved for a very interesting comedy. It is Moliere's play, "The Physician In Spite Of Himself." The theatre is easily reached by the suburban Pennsylvania train. It is the Hedgerow Theatre, Moylan, Pennsylvania. Mr. Jasper Deeter is the founder of this theatre and has started many actors and actresses on their way to fame both on Broadway and in Hollywood. The theatre is a reconditioned mill and is very quaint. The management is producing this play especially for the group and Mr. Deeter will appear in it. The tickets are \$1.10. Because of the limited number please send reservations to Miss Dorothea Zoll, 1420 W. Girard Ave., Philadelphia, Pennsylvania, as soon as possible.

WEDNESDAY, JUNE 10

7:30 P. M.—Annual Banquet

It will be held in the Benjamin Franklin Hotel. Dr. Stanley P. Reimann, pathologist of the Lankenau Research Institute, Philadelphia, will be the toastmaster and Dr. Ivor Griffith, President of the Philadelphia College of Pharmacy and Science, will be the guest speaker. Interesting entertainment will follow. The funds for this purpose will be given by Arthur H. Thomas Co. of Philadelphia. We are deeply grateful to them.

Due to present conditions, some slight changes may be substituted. These announcements will be made at the time of the Convention.

The Entertainment Committee sincerely hope, those attending the Convention will call on its members for suggestions of restaurants or places interesting to out of town visitors.



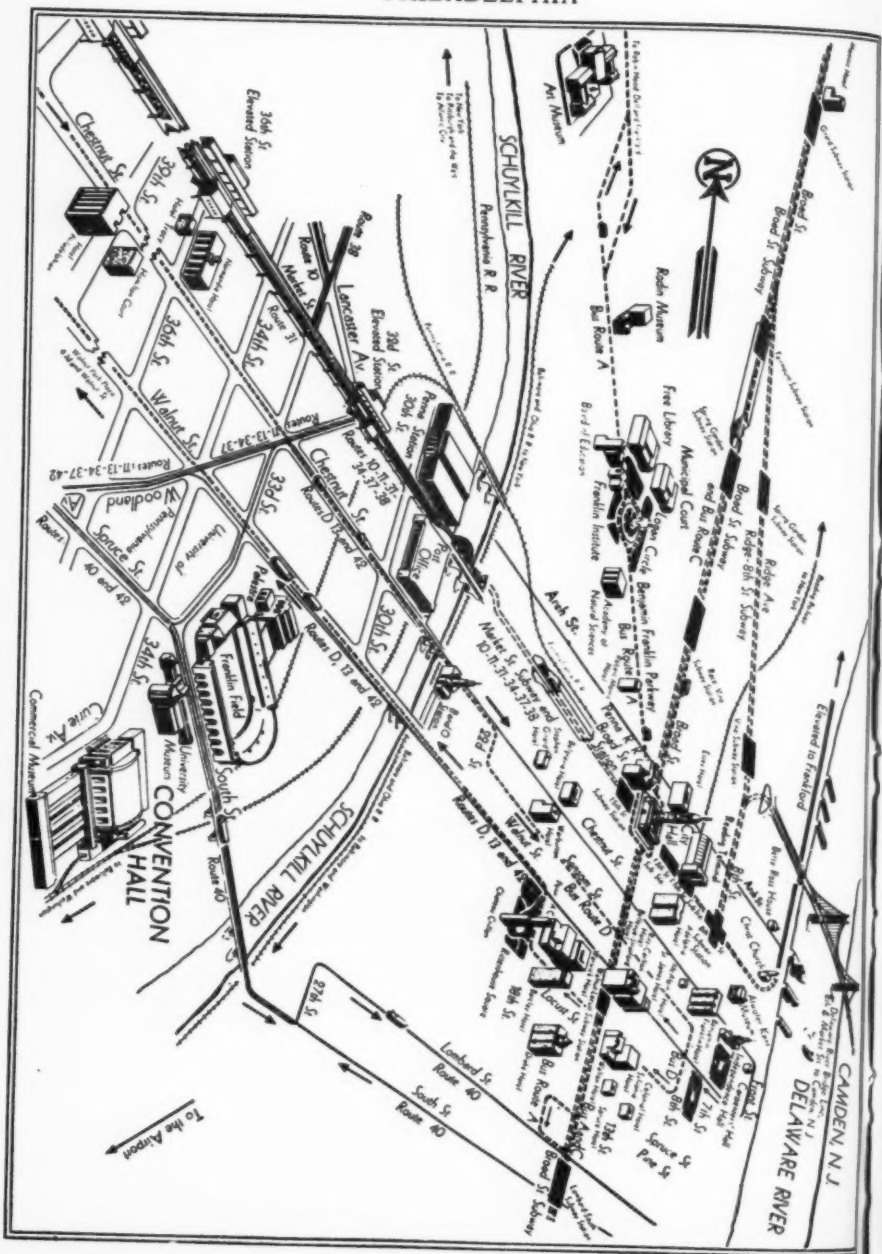
SCIENTIFIC EXHIBITS

1. "Camera Lucida and the Hemo-Protractor"
Cecelia M. Kortuem, M.T., (ASCP), Chicago, Illinois
2. "Photograph in a Hospital Laboratory"
Phyllis Stanley, M.T. (ASCP), Newark, New Jersey
3. "Micro Viewing Box"
"Rapid Sputum Suction Apparatus"
Max Lowenthal, M.T. (ASCP), Montclair, New Jersey
4. "Animal Martyrs to Science"
Arkansas Society of Medical Technologists
5. "State Publications"
Minnesota Society of Medical Technologists
6. Title to be announced
Texas Society of Medical Technologists
7. Title to be announced
District of Columbia Society of Medical Technologists
8. Title to be announced
Drs. Exton, Schattner, and Rose, Newark, New Jersey
9. "Trichomonas"
Dr. Herman A. Shelanski, Philadelphia, Pennsylvania

TECHNICAL EXHIBITS

1. Arthur H. Thomas Co., Philadelphia, Pennsylvania
2. A. S. Aloe Co., St. Louis, Missouri
3. Denver Chemical Co., New York, New York
4. Kimble Glass Co., Vineland, New Jersey
5. Central Scientific Co., Chicago, Illinois
6. Clay-Adams Co., New York, New York
7. Difco Laboratories, Detroit, Michigan
8. Williams, Brown and Earle, Philadelphia, Pennsylvania

PHILADELPHIA



TRANSPORTATION INFORMATION

Broad Street Station is the terminus for steam and electric trains of the Pennsylvania Railroad at Broad and Market Streets, on the northwest corner, opposite City Hall.

Pennsylvania Station, Thirtieth Street, located at Thirtieth and Market Streets, is of the newest and most modern type and is the principal station in the city of the Pennsylvania Railroad.

Broad Street Suburban Station is located under the new Broad Street Station Building at Sixteenth Street and Pennsylvania Boulevard. All Pennsylvania Railroad electrified suburban service in the Philadelphia area use this station.

Reading Terminal, located in the heart of the city at Twelfth and Market Streets, is the Philadelphia terminus of the Reading Company's steam and electrified services.

North Broad Street Station—New and impressive structure of Reading Company at Broad and Huntingdon Streets, connected with North Broad Street Subway, and furnishing service to northern end of city.

North Philadelphia Station—Pennsylvania Railroad Station at Broad Street and Glenwood Avenue.

Baltimore and Ohio Station is located at Twenty-fourth and Chestnut Streets.

Ferries foot of Market Street.

Municipal Airport, one of largest in world, just completed in Southwest Philadelphia on City's Model Farms tract and part of former Hog Island Shipyard on Penrose Ferry Road. Port for all major airlines of country.

The Automobile Club of Philadelphia—23 South Twenty-third Street. Chauffeurs available for sightseeing.

Keystone Automobile Club—Broad and Vine Streets. Chauffeurs available for sightseeing.



*Courtesy Conventions and Exhibitions Bureau
Philadelphia Chamber of Commerce*

UNIVERSITY OF PENNSYLVANIA

This famous institution, founded by Benjamin Franklin in 1740, occupies a great section of land on the west bank of the Schuylkill River close to the center of the city. It roughly extends from Walnut Street south to Pine Street and from Thirty-second Street to Thirty-eighth Street. One hundred and ten acres are embraced in the University grounds.



*Courtesy Conventions and Exhibitions Bureau
Philadelphia Chamber of Commerce*

COMMERCIAL MUSEUM



*Courtesy Conventions and Exhibitions Bureau
Philadelphia Chamber of Commerce*

CHEW MANSION SCENE OF BATTLE OF GERMANTOWN

